GUIDELINES FOR ROADWAY DESIGN ACTIVITIES

These guidelines were established to aid the Engineer in understanding the expectations of the North Carolina Department of Transportation throughout the roadway design process. Performance evaluations will be made at milestones II through VI. Evaluations will only be made on those items that are covered in the project scope of work as shown in the Engineering Agreement. These evaluations will be used in the selection process for future design contracts.

I. GENERAL INFORMATION

A. PROJECT CONTACT

All inquiries concerning the project shall be directed to the Engineering Coordination Project Engineer or Project Design Engineer. The PEF Engineer should not contact internal units of the NCDOT unless directed to do so by the Engineering Coordination Section. This policy is effective throughout the life of the project.

B. PLAN CONTROL AND STANDARDS

All plans, designs, specifications and estimates shall conform to the State's standard practices for highway construction, which are based on the latest edition of the following materials:

1. AASHTO - A Policy on Geometric Design of Highways and Streets
2. AASHTO - Roadside Design Guide
3. NCDOT - Policy and Procedure Manual for Roadway Design
4. NCDOT - Design Manual for Roadway Design
5. NCDOT - Standard Specifications for Roads and Structures
6. NCDOT - Roadway Standard Drawings
7. NCDOT - Resurfacing, Restoration and Rehabilitation Guide (3-R Guide)
8. NCDOT - Subdivision Roads Minimum Construction Standards
9. NCDOT - Policy on Street and Driveway Access to North Carolina
10. Highway Capacity Manual (All associated software shall be used as applicable, including any modifications as may be directed by the State during the life of this project. See Congestion Management Guidelines for more details)
11. MicroStation and GEOPAK software (see NCDOT web-site)

Where alternate designs appear to be feasible, the Engineer shall prepare material necessary to reach a decision as to the appearance, economy, safety, and capacity of the design to be used.

C. INFORMATION TO BE PROVIDED BY THE STATE TO THE ENGINEER

1. An approved Project Environmental Document

2. Basic design criteria

3. Updated traffic data

4. All pavement designs

5. Tentative project schedule

6. All required permits

7. Roadway Geotechnical Subsurface Investigation Recommendations **(See Appendix C)**

8. Copy of Public Hearing Map (if available) and/or preliminary designs

9. Title, symbology, summary and plan sheets provided in electronic format

10. Memos concerning design and/or policy changes

11. All other data in the hands of the State that can be released that would assist the Engineers in the accomplishment of work on the project

12. The latest available information can be found on the NCDOT web-site at: http://www.ncdot.org/doh/engineering **or http://www.ncdot.org/doh/preconstruct/highway/roadway/eng-coord/consultant.html.**

D. SERVICES TO BE PROVIDED BY THE ENGINEER TO THE STATE

1. **Prior to any submittal to the State, a responsible engineer of the firm shall carefully check all designs and computations.**

2. Detailed design assumptions will be provided by the Engineer prior to beginning design on the project. Example Design Assumptions are available from the Engineering Coordination Section. These design assumptions are subject to change during project development. The current NCDOT Design Manual criteria shall be utilized during design.

3. The Engineer will provide the State with all copies of the plans as needed for review of the work throughout the life of the contract.

4. All plans submitted by the Engineer shall be printed on white bond paper (OCE Bruning 45-9022 Opaque, 20 lb. or an equivalent thereof). Plans that are submitted on vellum, photo Mylar, blue prints, etc., are not acceptable. All full size reproducible copies shall be on 22" x 34" sheets and all half size reproducible copies shall be on 11”x17” sheets. All cross-sections containing thirty (30) or more sheets shall be on 11”x17” sheets. Cross-sections containing less than thirty sheets will be on 22”x34” sheets. A 3” border is required on the left end of all 22”x34” sheets. **Plans that do not meet these requirements will not be accepted**.

5. Estimated quantities at TIP Cost Estimate milestones

6. Wall envelopes for all retaining walls and noise walls

7. Special Details need to be requested by the Engineer as they are identified.

8. The firm will attend all meetings, consultations, and field inspections deemed necessary by the State or the Engineer. All conferences will be held in the vicinity of the project or in Raleigh, North Carolina.

9. The Engineer shall provide the State with electronic files of the plans and cross-sections at certain stages in the design process. **For more information on Electronic File Submittals, see Appendix A.**

II. PRELIMINARY REVIEW PLANS (25% Submittal)
(Note: Not to be confused with Preliminary Plans as described in the Design Manual)

Prior to beginning their design, the Engineer shall submit detailed design assumptions for approval by the State as shown on the project schedule, (see Appendix D). The State will provide an example to be used as a guide. Design criteria not in compliance with AASHTO should be brought to the State’s attention for evaluation of a design exception. Furthermore, interchange concepts (if applicable) should be reviewed and approved by Engineering Coordination prior to submitting the preliminary review plans. **For more information about Interchanges, see Appendix B.**

A. REQUIREMENTS FOR PRELIMINARY REVIEW (25% Submittal)

The Engineer shall submit for review, **15** sets of preliminary plans and **6** sets of cross-sections.

The Engineer shall prepare preliminary review plans that include but are not limited to the following:

1. When submitting preliminary review plans, the following shall be included according to the date shown on the project schedule, see Appendix D):

   a. Title Sheet

   b. Typical Sections

c. Plan and profile sheets with horizontal and vertical design for all alignments (including detours and service roads).

d. Vertical clearance calculations

e. Superelevation with arrows shown on plans and cross-sections

f. Structure Recommendations

g. Sight distance calculations at bridges or other obstructions

h. Capacity Analysis (see Congestion Management Guidelines)

i. Preliminary Interchange Design including ramp control gore calculations

j. Preliminary Intersection Design including superelevation, turn lanes, etc.

k. Shear Point Diagram (if applicable)

l. Property Owner Contact Forms (if surveys are part of the contract)

m. Copies of the Draft Culvert and/or Bridge Survey Report(s) should be submitted directly to the Hydraulic Design Unit (and cc: Engineering Coordination) one month after notice to proceed.

n. Preliminary Earthwork Summary sheet

o. Cross-sections

p. Preliminary slope stake lines

q. Preliminary construction phasing scheme

r. Design Exception Checklist (see NCDOT web-site)

*If the AASHTO criteria are not met, the Engineer will provide Engineering Coordination with a description and preliminary quantity estimate for the **additional** construction required to meet the AASHTO criteria and complete the design exception request.*

s. Project Coordination Checklist (if project joins another under design)

t. Phase Submittal Form (see Engineering Coordination web-site)

u. Electronic file submittal **(see Appendix A)**

2. The Engineer shall establish the most cost-effective preliminary horizontal and vertical alignment for the roadway including interchange and intersection layouts.

3. Survey base line shall be shown.

4. Ground surface profiles and preliminary grade profiles for the mainline and intersecting roads. If project requires a resurfacing grade, this should be submitted along with control point calculations for review. All -Y- line grades shall have mainline station & offset and edge of pavement elevation shown at the tie point.

5. Preliminary typical sections defining overall dimensions of the proposed design.

6. Preliminary cross-sections shall be shown for all proposed construction. This includes showing temporary slopes for traffic control and retaining wall locations. The cross-sections shall contain grid lines at (5 or 10)- foot intervals with the station and the existing elevation shown above the template. Grid combinations should be discussed and approved by the Engineering Coordination Project Engineer prior to preparing cross-sections. A bar scale shall be shown on all sheets.

7. All existing utilities shall be labeled with type, size and invert elevation.

Preliminary Review Plans will not be accepted until all of the above requirements are met.

B. REQUIREMENTS AFTER APPROVAL OF PRELIMINARY REVIEW PLANS

1. The Engineer shall submit 6 sets of plans and 3 sets of cross-sections to Roadway Design.

2. The Engineer is responsible for contacting the Hydraulics Unit to set up a Pre-Design Review. Dates for all hydraulic design submittals should be obtained at this meeting.

3. Upon completion of hydrological studies, the Engineer shall design all cross-drains, ditches, storm systems etc. as stated in the Hydraulic Design Guidelines.

4. The Engineer shall submit 1 copy of Bridge and/or R.C. Box Culvert Survey Report(s), all hydraulic calculations, and 1 copy of plan and profile sheets to the Hydraulics Unit for review and approval (if not previously submitted).

5. After the completion of all cross-sections and approval of the R.C. Box Culvert and/or Bridge Survey Report(s) (if applicable), the Engineer shall provide the State with 1 set of full-size preliminary review plans and cross-sections for the State's use in preparing for Roadway Geotechnical Subsurface Investigations **(see Appendix C)**. In addition to these plans, the Consultant shall also provide a printout of station and offsets from the baseline to the design alignment. The station and offsets should show on the plans at each baseline point. Electronic Files shall also be submitted at this time **(see Appendix A).**

6. Preliminary Estimate with quantity calculations

III. FINAL DESIGN OR COMBINED FIELD INSPECTION PLANS

Prior to submission of the Field Inspection Plans to Engineering Coordination, the Culvert and/or Bridge Survey Report(s) and drainage design shall be approved by the NCDOT Hydraulics Unit. All drainage items shall be shown on the Field Inspection Plans.

The Engineer shall submit for review, 2 sets of Pre-Field Inspection Review Plans including cross-sections.

A. In accordance with the project schedule (see Appendix D), the Engineer shall prepare Final Design or Combined Field Inspection Plans to include but not limited to the following:

1. Proposed design for the roadway, intersections and interchanges.

2. Existing ground surface profiles and project grade profiles for the mainline and intersecting roads (including resurfacing grades) and interchanges.

3. Final pavement design incorporated

4. Proposed guardrail design

5. The location and size of <u>all</u> drainage structures and systems required for complete drainage of the project

6. Delineation of wetlands and jurisdictional streams

7. The location of slope stake limits and construction limits including berm or lateral ditches and channel changes shall be shown

8. Details for all drainage ditches shall be included

9. All property lines within the right of way limits and immediately adjacent to the proposed right of way along with all bearings, curve data, distances and corners of such property lines obtained from field survey notes and deed descriptions. Property lines are to be tied to the proposed centerline for construction. The Engineer will be required to tie the properties if Location & Surveys is a part of their scope of work; otherwise, the State will provide property tie information. All affected parcels must show name of property owner.

10. The existing right of way lines of public roads within the project limits.

11. Proposed right of way and easements are to be appropriately labeled on the plans. Prior to setting the R/W and easements, the Engineer should consult with Engineering Coordination for proper methodology and consistency with adjacent projects. All right of way and easement points will be flagged with an offset station and distance. If the project is METRIC, the distances shall be labeled in both English and Metric units.

12. All typical sections required for construction of the project with final pavement design incorporated.

13. Roadway Geotechnical Recommendations shall be incorporated into the Roadway plans.

14. The Engineer shall provide cross-sections for all proposed construction.

15. The Engineer shall identify land-locked properties and provide the location of any proposed service roads (if applicable)

16. Construction phasing plan

17. Preliminary Earthwork Summary sheet

18. Preliminary Plans Checklist (see NCDOT web-site)

19. Project Coordination Checklist (if applicable; see NCDOT web-site)

20. Phase Submittal Form (see Engineering Coordination web-site)

21. Copy of the Field Inspection Questions (see the NCDOT web-site)
The Engineer shall select questions from the list that apply directly to the project. The Engineer may also incorporate additional questions into this list as needed.

Plans for this submittal will not be accepted until all of the above requirements are met.

B. Once the Pre-Field Inspection review comments are incorporated, the Engineer shall send the appropriate Division Engineer 6 sets of plans, 2 sets of cross-sections and field inspection questions that apply to the project. We suggest using some form of two-day mail service for print distribution. The Engineer can find the Division Office address on the NCDOT web-site or by calling Engineering Coordination.

C. The Engineer shall send the Unit Head of Roadway Design 25 sets of plans (1 not bound), 9 sets of cross-sections (1 not bound) and 2 full size title sheets. The Engineer shall also submit electronic files at this time **(see Appendix A)**.

D. Engineering Coordination and the Division Construction Engineer will set a date for the Final Design or Combined Field Inspection and notify the appropriate personnel involved.

E. Following the field inspection, Engineering Coordination will send the Engineer a field inspection recommendation letter addressing all items requiring revision. Prior to completing the Right-of-Way Plans, the Engineer shall incorporate all changes deemed necessary by Engineering Coordination resulting from the field inspection. The Engineer shall notify the Engineering Coordination Project Engineer or Project Design Engineer of any changes that were not incorporated (with explanations).

F. **After** the Final Design/Combined Field Inspection comments have been incorporated, the Engineer shall submit 1 set of full-size roadway plans and 1 set of **full-size**

cross-sections for the State's use in preparing the Subsurface Plans (if applicable). The Engineer shall also submit electronic files at this time **(see Appendix A)**.

IV. RIGHT-OF-WAY PLANS

The Engineer shall submit 1 set of Right-of-Way plans and cross-sections and 2 sets each of the following:

- Deed descriptions
- Appraisal data (if applicable)
- Pole Data (if applicable)
- Strip Map (if applicable)
  The Engineer shall add the proposed right-of-way lines to the right-of-way strip map. However, station and offsets for the right-of-way and easement markers are not required

This submittal should be made in accordance with the project schedule (see Appendix D).

A. The Engineer shall prepare right-of-way plans to include, but not limited to, the following:

1. Parcel numbers for all properties from which right of way or easements will be acquired.

2. Right of way stage quantity calculations (Including Seeding Quantity for the Roadside Environmental Unit and Earthwork Quantities) and estimate.

3. Right-of-Way Plans Checklist (see NCDOT web-site)

4. Project Coordination Checklist (if applicable; see NCDOT web-site)

5. Phase Submittal Form (see Engineering Coordination web-site)

6. Electronic file submittal **(see Appendix A)**

Plans for this submittal will not be accepted until all the above requirements are met.

B. The Engineer will be required to make all plan revisions including, but not limited to: right of-way, easements, property lines, owners names, etc. as requested by the State.

When revisions are made to the Right-of-Way plans, the Engineer shall place a revision note in the upper left-hand corner of the sheet with a blank space for the date.

For Example:

"Date:_____ - Parcel 1,2…; initial contacts"
or
"Date:_____ - Parcel 1; Revised Parcel Name" (*short description*)

These notes shall remain on all subsequent plans until the 100% stage.

All Right-of-Way Revision notes are to be removed at the 100% submittal.

The Engineers shall not begin the final design phase until authorized by the NCDOT.

V. PRE-LET FIELD INSPECTION AND/OR 90% SUBMITTAL

If a Pre-Let Field Inspection is required, the Engineer shall submit for review, 1 set of Field Inspection Review Plans and a copy of the Field Inspection Questions that apply to the project (see NCDOT web-site).

A. In accordance with the project schedule (see Appendix D), the Engineer shall prepare Pre-Let Field Inspection Plans to include, but not limited to, the following:

1. The Engineer should notify Engineering Coordination if the Right of Way Initial Contacts have not been received (and incorporated) prior to submitting Pre-Field Inspection Review Plans.

2. Quantity calculations and final engineer's estimate.

3. Project Coordination Checklist (if applicable; see NCDOT web-site)

4. Phase Submittal Form (see Engineering Coordination web-site)

Plans for this submittal will not be accepted until all the above requirements are met.

B. **After** review and approval of the above stated plans, the Engineer shall send the appropriate Division Engineer 6 sets of plans, 2 sets of cross-sections and a copy of the Field Inspection questions that apply to the project.

C. The Engineer shall send the Unit Head of Roadway Design 25 sets of plans (1 not bound), 10 sets of cross-sections (1 not bound) and 2 full size title sheets. The Engineer shall also submit electronic files at this time **(see Appendix A)**. All interchange details shall be reduced and inserted in the plans.

D. Engineering Coordination and the Division Construction Engineer will set a date for the Field Inspection and notify everyone involved.

E. Following the field inspection, Engineering Coordination will send the Engineer a field inspection recommendation letter addressing all items requiring revision. The Engineer shall incorporate all changes deemed necessary by Engineering Coordination resulting from the field inspection prior to completing the Final Roadway Construction Plans. The Engineer shall notify the Engineering Coordination Project Engineer or Project Design Engineer of any changes that were not incorporated (with explanations).

F. If a Pre-Let Field Inspection is not required, the Engineer shall provide the State with 3 Review sets of Final Roadway Construction Plans, 2 sets of cross-sections and 1 copy of computations (90% Submittal). Additionally, copies of any correspondence to support any quantity or pay item where calculations are not made shall be submitted for final review prior to acceptance. All interchange details shall be reduced and inserted in final plans. Engineer shall also submit electronic files at this time (see Appendix A).

VI. FINAL ROADWAY CONSTRUCTION PLANS (100% SUBMITTAL)

The Engineer shall prepare final construction plans, engineer's estimate and any other items required for letting the project to construction in accordance with the project schedule (see Appendix D), the conventional practices of the State and in conformance with the requirements of the Engineering Agreement.

A. The Engineer shall prepare Final Roadway Construction plans to include, but not limited to, the following:

1. List of General Notes (see NCDOT web-site)
2. List of Standard Details (see NCDOT web-site)
3. Special Details (provided by the State)
4. List of Special Provisions needed
5 Index of Sheets
6. Original Calculation of Quantities (to be finalized upon the State's review of 90% final plans)
7. Summary of Drainage items
8. Summary of Guardrail (temporary and permanent)
9. Summary of Pavement Removal
10. Earthwork Summary sheet
11. Earthwork Balance card
12. Engineer’s Estimate
13. Cost Based Estimate Quantity Breakdown (see NCDOT web-site)
14. Determination of lump sum grading warrants (see NCDOT web-site)
15. Final Plans Checklist (see NCDOT web-site)
16. Project Coordination Checklist (if applicable; see NCDOT web-site)
17. Phase Submittal Form (see Engineering Coordination web-site)

B. All quantity computations shall be done on the State's standard Computation of Quantity forms (See NCDOT web-site: *Contracts Office*).

C. Prior to turning in original plans and calculations, the Engineer(s) responsible for the Roadway and Hydraulic Design shall seal the title sheet and all plan sheets.

D. Once review comments from Project Service's Plan Checking Section have been incorporated, the Engineer shall submit 1 set of final construction plans and cross-sections. A full size Parcel Index Sheet showing the parcel number, sheet number and property owner shall be submitted separately from the plans.
Electronic files shall also be submitted at this time **(see Appendix A)**.

Plans for this submittal will not be accepted until all the above requirements are met.

[APPENDIX A]

ELECTRONIC FILE SUBMITTAL

Electronic Files shall be submitted to Engineering Coordination in accordance with the Guidelines for Roadway Design Activities, the Project Schedule and upon request from the Engineering Coordination Section.

A. WHEN TO SUBMIT FILES

Mandatory Electronic File Submittals are as follows:

1. Base Plan Submittal (Only if Base Plan Preparation is in the scope of work)

These files are reviewed by the Location & Surveys and Photogrammetry Units to ensure conformance to NCDOT standards.

2. Preliminary Review Plan Submittal (25% Submittal)

   The .gpk file shall be submitted along with the **Geopak Data File Transmittal** form (see Engineering Coordination web-site).

3. After 25% Approval

   These files are used by the Geotechnical Unit to perform Roadway Geotechnical Subsurface Investigations.

4. Final Design/Combined Field Inspection Submittal

   The Division Office uses these files to prepare for the Field Inspection.

5. Right-of -Way Submittal

   These files should incorporate all comments from the Final Design/Combined Field Inspection.
   The Geotechnical Unit uses these files to prepare the Subsurface Plans.
   These files are often requested by other NCDOT Units, Government Agencies and the General Public.

6. R/W Revision Submittals

   These files are needed to ensure that Engineering Coordination has the latest information resulting from a R/W revision.

7. Pre-Let Field Inspection Submittal

   The Division Office uses these files to prepare for the Field Inspection.

8. 100% Submittal

   These files should incorporate all comments from the Pre-Let Field Inspection.

   These files are provided to other Department Units as requested (Roadside Environmental Unit, Utilities, R/W, etc.)

9. After 100% Approval

   These files should incorporate all comments from the Final Plan Checking Section of the Project Services Unit.
   These files are archived and sent to the County Register of Deeds.

10. Construction Revision Submittals

    These files are used to ensure that the State has the latest information resulting from any revisions that are made after the plans have been let to construction.

B. FOLDER STRUCTURE

An electronic copy of NCDOT's TIP folder structure may be found on the Consultant Specific web site under Roadway Design (PEF Coord). Any questions about the location of actual files in reference to this folder structure may also be found on the Roadway Designs web site.*

C. FILE NAMING CONVENTION

Due to conflicts and confusion, all MicroStation design files will have the extension of .dgn. All Geopak.gpk files will also follow NCDOT's naming convention. More information about these naming conventions may be found on the Roadway Designs web site or IT CADD's website.*

D. FILE FORMAT

To establish uniformity among all PEF's, Roadway Design, and all other Highway Design Units, all electronic submittals must meet the following requirements:

- PEF's must use the same versions of MicroStation and Geopak as NCDOT*
- All plans must be coordinately correct
- All projects must be referenced/mapped through the R: drive
- NCDOT data base must be used for all applicable items including plans sheets
- The coordinate geometry point numbering convention must be followed*
- The Geopak Data File Transmittal form must be completed
- Use of all NCDOT Cell Libraries and Leveling DGN Library must be adhered to
- Chain and Profile names in .gpk file must match plans

E. STAND ALONE PES WORKSHEET

All final construction estimates shall be submitted using this application. Before each use, the pay items tables must be updated by downloading them from the Consultant Specific web site under Roadway Design.*

- **More information may be obtained from the Roadway Design Web Site under**
  http://www.ncdot.org/doh/preconstruct/highway/roadway/ **or**
  http://www.ncdot.org/doh/preconstruct/highway/roadway/eng_coord/ **or**
  http://www.ncdot.org/IT/engineering_transportation_systems/CADD/

[APPENDIX B]

INTERCHANGES

A. It is advisable to submit preliminary interchange design concepts as soon as possible for review by the Engineering Coordination Section prior to the Preliminary Plan Review submittal. These concepts should include the following information:

1. Preliminary grades for ramps
2. Ramp grade control calculations and sketches in gore areas (See the example in the Design Manual)
3. Vertical clearance calculations and critical points noted

4. Cross-sections through the gore area extending an additional 300’ beyond the gore area

5. Super-elevation with arrows shall be shown on the cross-sections and plan view

6. Critical sight distance calculations

7. Capacity analysis and storage recommendations

8. All other related factors that could influence the vertical and horizontal geometry of the interchange

B. Once the mainline and Y-line grades are approved all controls and calculations can be finalized.

C. Interchange detail sheets shall be prepared at a scale of 1" = 50' on 34" x 68" white bond sheets. These sheets shall meet the same requirements for content as specified for plan sheets. Ground profiles and proposed grade lines for ramps shall be prepared on separate sheets. Ramp stations shall begin at the -L- line and run toward the -Y- line. The direction of stationing on ramp profiles shall match the plan sheet.

D. For complex interchanges, a detail of the interchange shall be prepared on a separate sheet showing finished contours at 2' intervals between the mainline and ramps. These contour sheets are generally not required for simple diamond type interchanges. A reduction of the interchange sheet (22" x 34") shall be part of the Final Roadway Plan package. These contour sheets will be included as 2-series plan sheets.

E. A cross-section layout showing numbered shear points and break points shall be prepared for obtaining field data for earthwork. It is not necessary to use shear sections in diamond interchanges and other ramps that do not depart radically from the -L- alignment, unless requested by Engineering Coordination. These sheets will be included as 2-series plan sheets.

F. Slopes inside the gore areas 200'-300'± from nose, should be 6:1 or flatter. Slopes inside the interchange area should be a **maximum of 4:1**. Topographic conditions, wetlands, property values, and earthwork requirements may dictate steeper or flatter slopes. Interior slopes steeper than 4:1 will require written justification and approval by the State. The entire interchange shall be graded to provide adequate sight distances.

[APPENDIX C]

SUBSURFACE DATA FOR STRUCTURE AND ROADWAY

The State (or Engineer) will provide geotechnical inventory data and recommendations for structures and roadway portions of this project. The State (or Engineer) will also prepare all subsurface profiles for the construction plans on reproducible copies of the Engineer's Preliminary Plan and Profile. The State (or Engineer) will be responsible for all changes to these drawings and furnish the State (or Engineer) the final plans for inclusion in the construction documents. Subsurface recommendations are necessary for the design phase of project plan preparation. These recommendations may affect the following:

Project Grade Line:

In fill conditions, the underlying material and position of the water table may determine the position of the grade line.

In cut conditions, the position of the water table and the usability of the excavated material may affect the grade line. Often the excavation of unsuitable material can be avoided by adjustment of the grade line. Sag vertical curves with the low point in a cut should be avoided.

Slopes:

Slope stability will determine the maximum cut, fill, and end bent slopes to be used on the project. Slopes east of I-95 are generally 3:1 maximum.

Alignment:

Since areas with extremely poor subsurface conditions should be avoided, preliminary subsurface reviews should be made during preliminary design. Alternate construction methods are to be considered for poor subsurface conditions during the design of the project. For example, the use of boulevard (extra wide and deep) ditches should be used to lower the existing water table or the use of construction fabric in place of undercut and backfill.

Other items for consideration should be underdrain systems, stone embankment in standing water, select backfill in undercut areas which cannot be drained and settlement times and gauges and/or surcharges in areas with underlying deformable strata.

Undercut:

A detail of the typical section showing the limits of undercut is to be shown in the plans.

The limits of undercut shall be shown by cross-hatching in the profile view and on the cross-sections. The approximate depth of undercut shall be indicated by the lower edge of the cross-hatching.

Quantities of undercut shall be computed and shown in the summaries and pay item list as "undercut excavation".

Replacement backfill for undercut shall be computed and added to the embankment plus % column in the Earthwork Summary sheet and Earthwork Balance card.

Subsurface recommendations may require select backfill material to be used in some undercut areas. This quantity shall be computed and added to the pay item list.

Under some conditions, fabric for soil stabilization may be used in lieu of undercutting. The quantity of fabric shall be computed and added to the pay item list.

[APPENDIX D]

EXPLANATION OF PEF PROJECT SCHEDULE

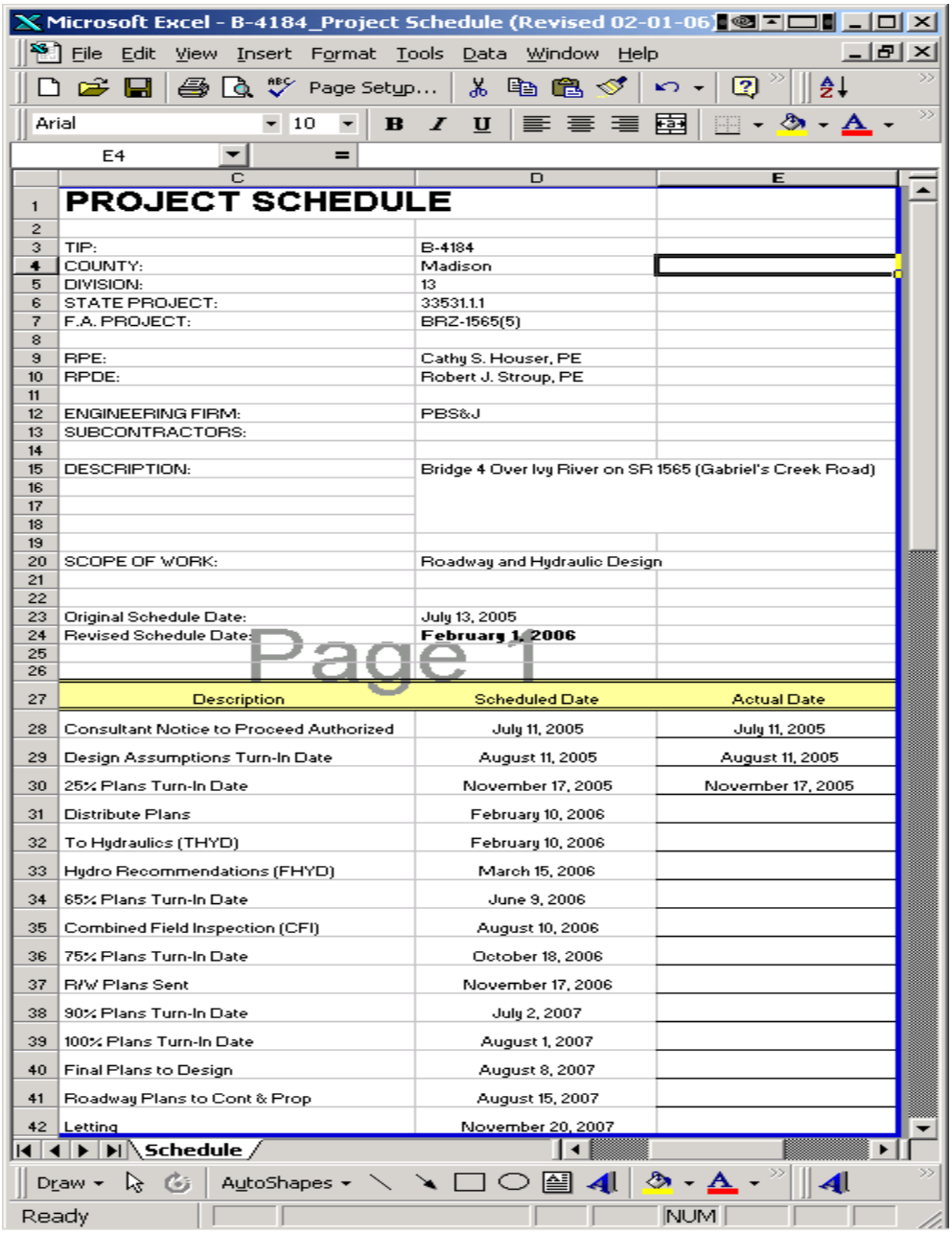
The PEF project schedule has been revised to reflect NCDOT's new Plan & Permit Review Process for all TIP projects. This new PEF project schedule also allows usage of NCDOT's new Critical Path management tool – PMii. The PEF project schedule is "milestone driven".

The PEF project schedule will be presented as shown and explained below.

Bridge Project Schedule

Example

An example of a Bridge Project Schedule is shown below.



Microsoft Excel - B-4184_Project Schedule (Revised 02-01-06)

File Edit View Insert Format Tools Data Window Help

Page Setup...

Arial 10

E4

	C	D	E
1	**PROJECT SCHEDULE**		
2			
3	TIP:	B-4184	
4	COUNTY:	Madison	
5	DIVISION:	13	
6	STATE PROJECT:	33531.1.1	
7	F.A. PROJECT:	BRZ-1565(5)	
8			
9	RPE:	Cathy S. Houser, PE	
10	RPDE:	Robert J. Stroup, PE	
11			
12	ENGINEERING FIRM:	PBS&J	
13	SUBCONTRACTORS:		
14			
15	DESCRIPTION:	Bridge 4 Over Ivy River on SR 1565 (Gabriel's Creek Road)	
16			
17			
18			
19			
20	SCOPE OF WORK:	Roadway and Hydraulic Design	
21			
22			
23	Original Schedule Date:	July 13, 2005	
24	Revised Schedule Date:	**February 1, 2006**	
25			
26			
27	Description	Scheduled Date	Actual Date
28	Consultant Notice to Proceed Authorized	July 11, 2005	July 11, 2005
29	Design Assumptions Turn-In Date	August 11, 2005	August 11, 2005
30	25% Plans Turn-In Date	November 17, 2005	November 17, 2005
31	Distribute Plans	February 10, 2006	
32	To Hydraulics (THYD)	February 10, 2006	
33	Hydro Recommendations (FHYD)	March 15, 2006	
34	65% Plans Turn-In Date	June 9, 2006	
35	Combined Field Inspection (CFI)	August 10, 2006	
36	75% Plans Turn-In Date	October 18, 2006	
37	R/W Plans Sent	November 17, 2006	
38	90% Plans Turn-In Date	July 2, 2007	
39	100% Plans Turn-In Date	August 1, 2007	
40	Final Plans to Design	August 8, 2007	
41	Roadway Plans to Cont & Prop	August 15, 2007	
42	Letting	November 20, 2007	

Page 1

Schedule

Draw AutoShapes

Ready NUM

Interpretation

The new PEF project schedule for Bridge Projects shall be interpreted as follows.

- Consultant Notice to Proceed Authorized
  This is the date that Notice to Proceed is given to the PEF.
  Begin Culvert and/or Bridge Survey Report(s).

- Design Assumptions Turn-In Date
  The PEF should submit the Design Assumptions to NCDOT.

- 25% Plans Turn-In Date
  25% Plans are due to NCDOT on this date.
  This will be the Evaluation date for “Ability to meet schedule ...”

- Distribute Plans
  This date is the date that 25% Plans Approval is given.
  NCDOT will also request Geotechnical Recommendations and Final Pavement Design on this date.

- To Hydraulics (THYD)
  This date should be the same as the Distribute Plans date and the 25% Plans Approval date.
  Roadway hydraulic design will be authorized to begin on this date.

- Hydro Recommendations (FHYD)
  The Hydraulics Design is approved on this date and can be added to the Roadway Plans for the 65% submittal.

- 65% Plans Turn-In Date
  The PEF should submit the Pre-CFI Review Plans on this date.
  This will be the Evaluation date for "Ability to meet schedule ..."

- Combined Field Inspection (CFI)
  The Combined Field Inspection is held on this date.

- 75% Plans Turn-In Date
  The PEF should submit the Pre-R/W Review Plans on this date.
  This will be the Evaluation date for "Ability to meet schedule ..."

- R/W Plans Sent
  NCDOT sends the plans to R/W on this date.
  This is the official R/W date shown on the Title Sheet.

- 90% Plans Turn-In Date
  On this date, the PEF submits the 90% plans and quantities in accordance with these guidelines.
  This will be the Evaluation date for "Ability to meet schedule ..."

- 100% Plans Turn-In Date
  On this date the PEF will submit the Final plans package as described in these guidelines.
  This will be the Evaluation date for "Ability to meet schedule ..."

- Final Plans to Design
  On this date Engineering Coordination will receive plans from other units (i.e. Traffic Control, Utilities, Pavement Marking, etc.)

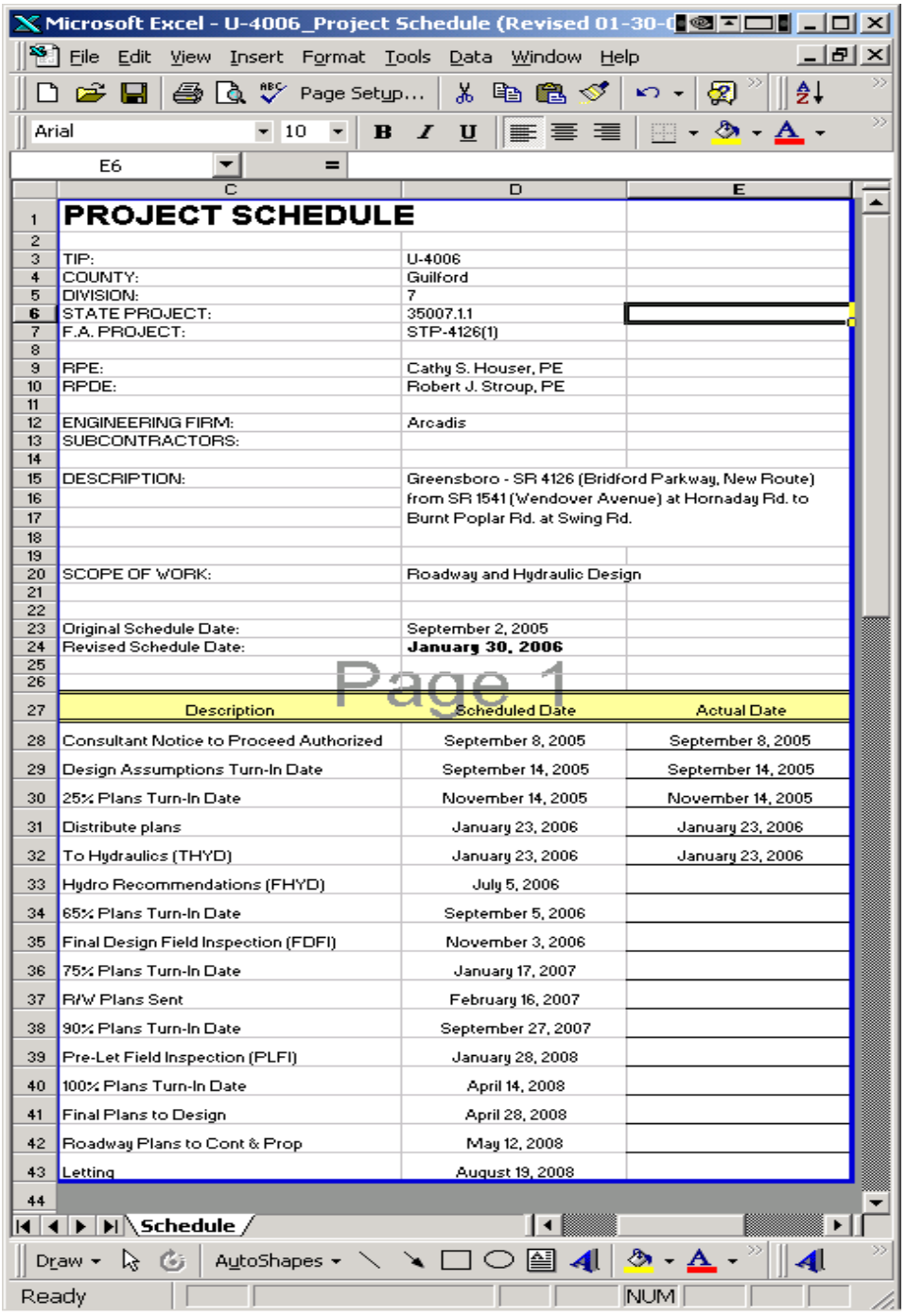
- Roadway Plans to Cont & Prop
  This is the submittal date of the Final P, S & E package to Plan Checking.

- Letting
  This is the official Let Date shown on the Title Sheet of the Roadway Plans.

New Location and Widening (I, R & U) Project Schedule

Example

An example of a New Location and Widening (I, R & U) Project Schedule is shown here.



Microsoft Excel - U-4006_Project Schedule (Revised 01-30-0

File Edit View Insert Format Tools Data Window Help

Page Setup...

Arial 10 B I U

E6 =

	C	D	E
1	**PROJECT SCHEDULE**		
2			
3	TIP:	U-4006	
4	COUNTY:	Guilford	
5	DIVISION:	7	
6	STATE PROJECT:	35007.1.1	
7	F.A. PROJECT:	STP-4126(1)	
8			
9	RPE:	Cathy S. Houser, PE	
10	RPDE:	Robert J. Stroup, PE	
11			
12	ENGINEERING FIRM:	Arcadis	
13	SUBCONTRACTORS:		
14			
15	DESCRIPTION:	Greensboro - SR 4126 (Bridford Parkway, New Route)	
16		from SR 1541 (Wendover Avenue) at Hornaday Rd. to	
17		Burnt Poplar Rd. at Swing Rd.	
18			
19			
20	SCOPE OF WORK:	Roadway and Hydraulic Design	
21			
22			
23	Original Schedule Date:	September 2, 2005	
24	Revised Schedule Date:	**January 30, 2006**	
25			
26			
27	Description	Scheduled Date	Actual Date
28	Consultant Notice to Proceed Authorized	September 8, 2005	September 8, 2005
29	Design Assumptions Turn-In Date	September 14, 2005	September 14, 2005
30	25% Plans Turn-In Date	November 14, 2005	November 14, 2005
31	Distribute plans	January 23, 2006	January 23, 2006
32	To Hydraulics (THYD)	January 23, 2006	January 23, 2006
33	Hydro Recommendations (FHYD)	July 5, 2006	
34	65% Plans Turn-In Date	September 5, 2006	
35	Final Design Field Inspection (FDFI)	November 3, 2006	
36	75% Plans Turn-In Date	January 17, 2007	
37	R/W Plans Sent	February 16, 2007	
38	90% Plans Turn-In Date	September 27, 2007	
39	Pre-Let Field Inspection (PLFI)	January 28, 2008	
40	100% Plans Turn-In Date	April 14, 2008	
41	Final Plans to Design	April 28, 2008	
42	Roadway Plans to Cont & Prop	May 12, 2008	
43	Letting	August 19, 2008	
44			

Page 1

Schedule

Draw AutoShapes

Ready NUM

Interpretation

The new PEF project schedule for <u>New Location and Widening (I, R & U) Projects</u> shall be

interpreted as follows.

- Consultant Notice to Proceed Authorized
  This is the date that Notice to Proceed is given to the PEF.
  Begin Culvert and/or Bridge Survey Report(s).

- Design Assumptions Turn-In Date
  The PEF should submit the Design Assumptions to NCDOT.

- 25% Plans Turn-In Date
  25% Plans are due to NCDOT on this date.
  This will be the Evaluation date for "Ability to meet schedule ..."

- Distribute Plans
  This date is the date that 25% Plans Approval is given.
  NCDOT will also request Geotechnical Recommendations and Final Pavement Design on this date.

- To Hydraulics (THYD)
  This date should be the same as the Distribute Plans date and the 25% Plans Approval date.
  Roadway hydraulic design will be authorized to begin on this date.

- Hydro Recommendations (FHYD)
  The Hydraulics Design is approved on this date and can be added to the Roadway Plans for the 65% submittal.

- 65% Plans Turn-In Date
  The PEF should submit the Pre-FDFI Review Plans on this date.
  This will be the Evaluation date for "Ability to meet schedule ..."

- Final Design Field Inspection (FDFI)
  The Final Design Field Inspection is held on this date.

- 75% Plans Turn-In Date
  The PEF should submit the Pre-R/W Review Plans on this date.
  This will be the Evaluation date for "Ability to meet schedule ..."

- R/W Plans Sent
  NCDOT sends the plans to R/W on this date.
  This is the official R/W date shown on the Title Sheet.

- 90% Plans Turn-In Date
  On this date, the PEF submits the 90% plans and quantities in accordance with these guidelines. These plans will also be the Pre-PLFI Review Plans. NCDOT will review the plans and return to the PEF for submittal and distribution the PLFI plans. The reviewed quantity package will be returned to the PEF at the PLFI or when NCDOT submits PLFI comments to the PEF.
  This will be the Evaluation date for "Ability to meet schedule ..."

- Pre-Let Field Inspection (PLFI)
  The Pre-Let Field Inspection is held on this date.

- 100% Plans Turn-In Date
  On this date the PEF will submit the Final plans package as described in these guidelines.
  This will be the Evaluation date for “Ability to meet schedule ...”

- Final Plans to Design
  On this date Engineering Coordination will receive plans from other units (i.e. Traffic Control, Utilities, Pavement Marking, etc.)

- Roadway Plans to Cont & Prop
  This is the submittal date of the Final P, S & E package to Plan Checking.

- Letting
  This is the official Let Date shown on the Title Sheet of the Roadway Plans.